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cational standards can not be permanently successful till they are fully related with the larger movement, the movement toward the determination of world-standards.

It has been necessary to limit this discussion by taking account only of higher and professional education. The movements of the time, however, relate as well to education of secondary and elementary grade, and some of their most interesting results may be looked for on those lower and broader fields. But as professional and higher instruction must in some measure determine the bounds of all instruction, it is natural that, as an international question, we should have first to do with standards in these departments of teaching. The bachelor's degree, the doctorate in philosophy and science, and the certificate of competence to practise medicine, are pivotal points as regards the international question.

The devising of practical procedure in this matter will call for serious consideration. With reference to such procedure, I beg to offer, in closing, the following suggestions:

On its academic side the standards-problem must be wrought out in this country chiefly by concerted action of the institutions concerned. It is of the utmost consequence that these institutions should find ways of working together, and avoid the danger of working at cross-purposes. The National Government has to do with the matter directly as an international question. Whatever diplomatic representations may be made in the matter from time to time must, of course, pass through the Department of State, and in these matters that Department acts ordinarily in consultation with the Department of the Interior. The Bureau of Education accordingly, for the Department of the Interior, forms the connection between the Govern-

ment and the academic bodies which are concerned with the formulation of our American standards. It seems desirable that a consultative council for higher and professional education should be attached to the Bureau of Education, with a view to the effective handling of this and related questions, and that competent specialists should be employed on the staff of that office to deal with such questions. Direct conference between the educational bodies and educational leaders of this country and those of foreign countries, touching agreement concerning educational requirements and credentials, becomes increasingly desirable. Within the next few years it is to be hoped that such conferences may be frequently held. It should be a part of the program of American education to further the holding of such international conferences, and to bear our fair part in the proceedings of such conferences.

ELMER ELLSWORTH BROWN.

*THE GEOGRAPHICAL DISTRIBUTION OF  
THE STUDENT BODY AT A NUMBER  
OF UNIVERSITIES AND COLLEGES*

THE accompanying table explains the geographical distribution of the student body of twenty-one American universities, five New England colleges for men, five colleges for women, two technological schools and one Pennsylvania college and engineering school for men, for the academic year 1908-9, the summer session students being in every case omitted. *Indiana, Iowa, Johns Hopkins, Kansas, Nebraska, Northwestern and Stanford* have been added to the list, and the institutions have been separated into groups as they were last year.

Comparing the attendance by divisions of the six eastern universities (*Columbia, Cornell, Harvard, Pennsylvania, Princeton, Yale*) with the corresponding figures for the same universities in a similar table



## B—FOREIGN COUNTRIES

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published in SCIENCE,<sup>1</sup> we note that there has been a gain for these universities, taken as a whole, in every division except one, namely, the South Central, which in 1908 exhibited an increase of 36 students. The largest increase by far was naturally recorded in the North Atlantic division, which was followed by the South Atlantic with an increase of 67 students, the North Central with a gain of 52, the Western with one of 39, and the insular and non-contiguous territories with one of 21. Foreign countries show an increase of only 11 over last year, while the South Central division has lost 44 students. The total increase in divisions outside of the North Atlantic was only 135 as against 381 last year, 189 in 1907 and 91 in 1906. So far as the gain in foreign patronage is concerned, this year's increase of 11 compares rather unfavorably with that of 92 in 1908, 64 in 1907 and 87 in 1906. Calculated on a percentage basis, the total gain of the six universities in the North Atlantic division during the past year amounted to 5.17 per cent., as against a gain of 2.89 per cent. outside of the division mentioned. This is the first time in several years that the percentage of increase has been larger in the North Atlantic division than outside of it, the total gain in the North Atlantic division in 1908 having been 2.30 per cent., as against an increase of 8.16 per cent. outside of the division mentioned, and in 1907 3.51 per cent. as against 5.73 per cent. In the South Atlantic division all of these institutions with the exception of *Harvard* show gains; in the insular and non-contiguous territories all with the exception of *Princeton* have experienced an increase; in the western division all show a small increase; in the North Central division the

gains of *Columbia* and *Cornell* outweigh the losses of the other four, while in foreign countries the gains of *Cornell*, *Harvard* and *Pennsylvania* more than compensate for the losses of the three remaining institutions; *Princeton* alone shows a gain in the South Central division.

Comparing these figures with those of 1905, we observe that the most substantial gains have been made by *Cornell* (140), *Columbia* (136) and *Yale* (59) in the North Central division; by *Cornell* (54), *Pennsylvania* (43), *Princeton* (38) and *Columbia* (34) in the South Atlantic division; by *Columbia* (18) in the South Central division, and by *Pennsylvania* (99), *Cornell* (57), *Harvard* (53) and *Columbia* (49) in foreign countries.

Taking the universities in the accompanying table by divisions, we find that *Harvard* has been passed in the North Atlantic division by both *Columbia* and *Pennsylvania*, *Cornell*, *Yale* and *Princeton* following in the order named. Of the western institutions, *Michigan* has by far the strongest hold on this division, attracting 620 students (as against 394 in 1905) to *Ohio's* 72, *Northwestern's* 71, *Illinois's* 66 and *Wisconsin's* 58. All of the western institutions included in both this year's and last year's tables show an increase in their clientele from this division with the exception of *Ohio* and *Wisconsin*, *Virginia* also showing a loss. *Harvard*, as usual, leads in all of the New England states, with the natural exception of Connecticut, where *Yale* has the largest following. *Columbia*, of course, has a considerable lead in New York and New Jersey, both *Columbia* and *Pennsylvania* drawing more students from that state than *Princeton* does, although it must be remembered that the professional schools give the two first-mentioned institutions an advantage over *Princeton*. *Columbia* is followed in New

<sup>1</sup> N. S., Vol. XXVIII., No. 722, October 30, 1908, pp. 577-585.

York state by *Cornell*, *Yale*, *Harvard*, *Princeton*, *Pennsylvania*, although *Michigan* attracts more students from the Empire state (391, as against 195 in 1905) than *Princeton* or *Pennsylvania*. In New Jersey *Columbia* is followed by *Pennsylvania*, *Princeton*, *Cornell*, *Yale*, *Harvard*. *Pennsylvania* naturally leads in its own state, being followed by *Cornell*, *Princeton*, *Yale*, *Harvard*, *Columbia*, this order being identical with that of 1908.

Examining next the attendance of the group of men's colleges and technological schools, we note that the order for the entire division is *Massachusetts Institute of Technology*, *Dartmouth*, *Lehigh*, *Amherst*, *Williams*, *Bowdoin*, *Wesleyan*—*Purdue* naturally bringing up the rear. All of the institutions in this group show an increase in their representation from the North Atlantic states as compared with 1908. In New York state the order for the colleges remains unchanged, namely, *Williams*, *Amherst*, *Dartmouth*, *Massachusetts Institute of Technology*, *Wesleyan*, *Lehigh*, *Bowdoin*. Of the six New England institutions included in both the 1908 and 1909 tables, 29 per cent. of the students of *Amherst* as against 43 per cent. in 1906 have their permanent home in Massachusetts; *Bowdoin* draws 73 per cent. of its student body from Maine, as against 77 per cent. last year; 19 per cent. of *Dartmouth's* students, as against 24 per cent. in 1906 come from New Hampshire (25 per cent. as against 21 per cent. in 1906 from New Hampshire and Vermont); *Massachusetts Institute of Technology* drew 57 per cent. of its student body from Massachusetts, as against 55 per cent. last year, this being the sole instance of an increase in the percentage of patronage from the home state; 30 per cent. of *Wesleyan's* students, as against 35 per cent. last year, claim Connecticut as their permanent

home, while *Williams* continues to enroll 20 per cent. of its student body from Massachusetts. *Williams* draws more than twice as many students from New York as from Massachusetts, *Amherst* also attracts more from the Empire state than from Massachusetts, and *Dartmouth* attracts more than twice as many from Massachusetts as from New Hampshire. 60 per cent. of *Lehigh's* student body hails from Pennsylvania, as against 58 per cent. in 1908 and 1907 and 60 per cent. in 1906, while 76 per cent. of *Purdue's* students claim Indiana as their permanent residence, this figure having remained stationary since 1908. It is thus seen that of the institutions included in this group *Dartmouth* attracts the largest percentage of students from outside of its own state, followed by *Williams*, *Amherst*, *Wesleyan*, *Massachusetts Institute of Technology*, *Lehigh*, *Purdue* and *Bowdoin*.

Of the eastern universities, *Pennsylvania* still possesses the largest percentage of enrolment from its own state, namely, 68 per cent., as against 67 per cent. in 1906; of *Columbia's* student body 63 per cent. come from New York state, as against 66 per cent. in 1906 and only 45 per cent. in the 1909 summer session; *Cornell's* percentage of New York students has dropped from 56 per cent. in 1906 to 53 per cent. in 1909; of *Harvard's* students 53 per cent., as against 54 per cent. in 1906, are residents of Massachusetts; of *Yale's* students 34 per cent., as against 33 per cent. in 1906, have their permanent residence in Connecticut, and of *Princeton's* students only 20 per cent., the same as in 1906, are residents of the state of New Jersey. In no individual case do these figures differ more than one per cent. as compared with last year, while compared with 1906 *Columbia* and *Cornell* have each increased their outside patronage by three per cent.,

*Harvard* has increased it by one per cent., *Princeton* has remained uniform, while the outside clientele of *Pennsylvania* and *Yale* has been lowered one per cent. since 1906. Of the other eastern universities included in the table *Virginia* draws 56 per cent. of its student body from its own state as against 53 per cent. in 1908, while *Johns Hopkins* attracts 43 per cent. of its students from Maryland.

Coming to the South Atlantic division and taking into consideration only the six eastern universities, we note that the order has not changed for the last three years, it being *Cornell*, *Pennsylvania*, *Columbia*, *Harvard*, *Princeton*, *Yale*, although *Johns Hopkins* and *Virginia* naturally have a larger following in this section than any of the northern institutions, and yet *Columbia* draws more students from North Carolina, South Carolina and Georgia than *Virginia* does. *Chicago* and *Michigan* are the only western institutions to make a fair showing in this group of states, while *Lehigh*, *Massachusetts Institute of Technology* and *Bryn Mawr* are the only colleges with a good representation from this division, their main strength lying in Maryland. So far as the individual states are concerned, *Pennsylvania* naturally leads in Delaware and *Johns Hopkins* in Maryland; *Cornell* leads in the District of Columbia, *Virginia* in Florida, its own state and West Virginia, and *Columbia* in Georgia and North Carolina, tying with *Johns Hopkins* in South Carolina. *Johns Hopkins* is second in Virginia, followed by *Cornell* and *Columbia*. Leaving the state of Virginia out of consideration and omitting *Johns Hopkins* on account of its large Maryland clientele, we note that all of the remaining six eastern universities with the exception of *Yale* have a larger following in the South Atlantic division than *Virginia*.

In the South Central division *Virginia* heads the list, followed by *Harvard* (91, as against 80 in 1905), *Columbia* (90-72) and *Michigan* (90-64), *Cornell* (88-76) and *Yale* (88-80), *Missouri*, *Illinois*, *Pennsylvania* (56-44), *Johns Hopkins*, *Northwestern* and *Princeton* (52-72). *Michigan* and *Columbia* have made the largest gains in this division, while *Princeton* shows a decrease since 1905. With the exception of *Massachusetts Institute of Technology*, the New England colleges have only a small following in this group of states. *Smith*, *Vassar* and *Wellesley* make a far better showing in both divisions than *Amherst*, *Bowdoin*, *Dartmouth*, *Wesleyan* or *Williams*, as they do in the North Central division. Indeed, the girls' colleges have a much less local attendance than the New England colleges for men, this being conclusively demonstrated by the following figures: From the three divisions just mentioned *Smith* draws altogether 380 students, *Wellesley* 298 and *Vassar* 297, as against 146 for *Dartmouth*, 96 for *Williams*, 83 for *Amherst*, only 23 for *Wesleyan* and only 7 for *Bowdoin*. *Bryn Mawr* attracts 138 of its students from the same section and *Massachusetts Institute of Technology* 211. *Smith* draws 119 students from the state of Illinois alone, more than *Amherst*, *Bowdoin* and *Wesleyan* combined do from the three divisions under discussion. *Barnard* college, on the other hand, has only 14 students from these three divisions. The largest representation from the individual states is found at the following universities: Alabama—*Virginia*, *Columbia*, *Pennsylvania*; Arkansas—*Missouri*, *Cornell* and *Virginia*; Kentucky—*Virginia*, *Michigan*, *Harvard*; Louisiana—*Yale*, *Cornell*, *Columbia*; Mississippi—*Virginia*, *Cornell*, *Illinois*; Oklahoma—*Kansas*, *Missouri*, *Northwestern*; Tennessee—*Virginia*, *Harvard*, *Yale*; and Texas—*Columbia*, *Cornell*, *Johns Hopkins*.

In the North Central division the order for the institutions located in that region is *Minnesota, Illinois, Wisconsin, Michigan, Nebraska, Northwestern, Ohio State, Missouri, Iowa, Kansas, Indiana, Purdue*. All of these, naturally, have a larger patronage in this division than any of the eastern universities, which come in the order *Yale, Cornell, Harvard, Columbia, Pennsylvania, Princeton, Johns Hopkins, Virginia—Cornell and Harvard* having exchanged places since last year. At the prominent universities of the middle west, the percentage of attendance from outside of the state in which the institution is located is, with the exception of *Chicago, Michigan* and *Northwestern*, much lower than it is in the case of the eastern institutions. The figures for percentage of enrolment from the home state are as follows: *Michigan* 54 per cent., *Northwestern* 56 per cent., *Wisconsin* 79 per cent., *Illinois* 80 per cent., *Missouri* 83 per cent., *Kansas* and *Ohio State* 90 per cent. each, *Iowa* 91 per cent., *Minnesota* 93 per cent., *Indiana* 94 per cent. and *Nebraska* 95 per cent. Of the two large universities on the Pacific coast *Stanford* is much less local in its student patronage than the *University of California*, the figures being 79 per cent. and 93 per cent., respectively. The largest gains (30 or more) in individual states since 1905 have been made in Illinois by *Columbia* and in Ohio by *Cornell* and *Yale*. *Columbia's* representation in this group of states has grown from 262 to 398 in four years, *Cornell's* from 381 to 521, *Yale's* from 506 to 595, *Pennsylvania's* from 139 to 186, while *Harvard's* has dropped from 526 to 502, and *Princeton's* from 209 to 162. Of the New England colleges for men, *Dartmouth* (127) has outgrown *Massachusetts Institute of Technology* (121) since last year in the size of its clientele from this division, *Will-*

*iams* being third (90) and *Amherst* fourth (64), while the order for the girls' colleges is *Smith, Vassar, Wellesley, Bryn Mawr, Mt. Holyoke*. The first three of the girls' colleges mentioned have a much larger clientele from this division than either *Pennsylvania* or *Princeton*. The representation of *Amherst* in these states has grown from 43 to 64 in three years, that of *Dartmouth* from 91 to 127 and that of *Williams* from 86 to 90. Leaving the state institution or institutions out of consideration in each case, *Wisconsin* is seen to have the largest following in Illinois, having passed *Michigan* since last year, *Yale, Cornell, Smith* and *Harvard* following. *Michigan* retains its lead in Indiana, and is followed in that state by *Northwestern, Illinois, Columbia, Harvard, Cornell* and *Wisconsin*. In Iowa the order is *Northwestern, Wisconsin, Illinois, Michigan, Nebraska, Harvard*; in Kansas—*Northwestern, Missouri, Michigan, Illinois, Nebraska, Columbia*; in Michigan—*Northwestern, Illinois, Cornell, Columbia* and *Yale, Vassar*; in Minnesota—*Northwestern, Yale, Smith, Wisconsin, Columbia* and *Michigan*; in Missouri—*Kansas, Northwestern, Illinois, Yale, Harvard* and *Michigan*; in Nebraska—*Northwestern, Illinois, Michigan, Columbia, Yale* and *Wellesley*; in North Dakota—*Minnesota, Northwestern, Wisconsin, Illinois, Harvard* and *Michigan*; in Ohio—*Michigan, Cornell, Yale, Harvard, Purdue, Columbia*; in South Dakota—*Northwestern, Minnesota, Wisconsin, Michigan, Illinois, Iowa*; in Wisconsin—*Northwestern, Illinois, Minnesota, Michigan, Cornell, Vassar—Northwestern* being mentioned first in seven of the 12 states included in this division.

In the western division (leaving *California* and *Stanford* out of consideration) *Michigan* is still in the lead, with *North-*



western, *Harvard*, *Columbia* and *Yale*, each of which attracts over one hundred students from this section, following; then come *Cornell*, *Illinois*, *Missouri*, *Wisconsin*, *Massachusetts Institute of Technology*, *Pennsylvania* and *Smith*, the remaining institutions all drawing less than fifty students from this division. *Michigan's* representation has grown from 134 to 200 since 1905; *Harvard's* from 126 to 144; *Columbia's* from 111 to 124; *Yale's* from 78 to 115; *Cornell's* from 76 to 95; *Illinois's* from 41 to 67; *Pennsylvania's* from 22 to 52; while *Princeton's* has dropped from 41 to 37. *Michigan* leads in Arizona, Colorado, Idaho, Montana and Oregon; *Harvard* in California, *Missouri* in New Mexico, *Northwestern* in Utah and Washington and *Nebraska* in Wyoming. *Columbia* is second in California and Oregon, and *Michigan* in Washington.

Taking only the six eastern institutions mentioned at the beginning of the article into consideration and counting ties in fractions, we find that *Columbia* leads in  $13\frac{5}{8}$  states, *Harvard* in  $13\frac{1}{3}$ , *Cornell* in  $9\frac{1}{2}$ , *Yale*, in 9, *Pennsylvania* in  $3\frac{1}{3}$  and *Princeton* in none, as follows: *Columbia*—New Jersey, New York, Georgia, North Carolina, South Carolina, Alabama, Texas, Indiana, Kansas, Nebraska, Arizona ( $\frac{1}{2}$ ), Montana ( $\frac{1}{2}$ ), Nevada ( $\frac{1}{3}$ ), New Mexico ( $\frac{1}{2}$ ), Oregon, Washington; *Harvard* in Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, Kentucky, Oklahoma, Tennessee, Iowa, North Dakota, South Dakota, California, Nevada ( $\frac{1}{3}$ ), Wyoming; *Cornell* in the District of Columbia, Maryland, Virginia, Arkansas, Mississippi, Michigan, Ohio, Wisconsin, Montana ( $\frac{1}{2}$ ), Utah; *Yale* in Connecticut, Florida, West Virginia, Louisiana, Illinois, Minnesota, Missouri, Arizona ( $\frac{1}{2}$ ), Colorado, New Mexico ( $\frac{1}{2}$ ); *Pennsylvania* in Pennsylvania, Delaware, Idaho, Nevada ( $\frac{1}{3}$ ).

*Cornell* maintains its lead in the number of students from insular and non-contiguous territories, being followed by *Illinois* and *Pennsylvania*. *California* leads in Alaska and Hawaii, *Illinois* in the Philippines, *Cornell* in Porto Rico and *Pennsylvania* in the Canal Zone.

The number of foreign students at American institutions of learning is rapidly on the increase, and it is safe to say that the day is not very far distant when there will be more German students at American universities than American students at German universities. There were enrolled in 1909, 794 foreigners at the six eastern universities, as against 540 in 1905. Adding the foreign clientele of the other institutions in the table, we find that 34 American institutions attracted no less than 1,467 foreigners during the academic year 1908-9, this figure being, as all the other comparisons have been, exclusive of the summer session attendance. *Columbia* attracted no less than 42 foreigners to its current summer session, and no doubt several other universities can make a similarly good showing for the summer term. Taking the representation of foreigners at all of the institutions included in the table, it is found that the largest delegations are sent by the following countries: Canada 242, China 193, Japan 158, Mexico 81, Great Britain and Ireland 71, Cuba 70, India 60, Germany 56, Argentine Republic 52, Turkey 51 and Russia 50; China having passed Japan since last year, England having passed Cuba and India and Germany the Argentine Republic. 460 of the 1,467 foreigners hail from North America, 458 from Asia, 313 from Europe, only 154 from South America, 64 from Australasia and 18 from Africa.

Owing to the large delegation of foreigners in its dental school, *Pennsylvania* with 225 students from foreign countries continues to head the list, being followed by

*Columbia* 166, *Cornell* 157, *Harvard* 147, *Yale* 86, *Massachusetts Institute of Technology* 72, *Northwestern* 71 and *Michigan* 69. *Lehigh* with its 25 foreigners and *Purdue* with 19, make a far better showing than any of the New England colleges, while *Bryn Mawr*, *Mt. Holyoke*, *Smith*, *Vassar* and *Wellesley* have only 31 foreign students altogether, as against 21 at *Amherst*, *Bowdoin*, *Dartmouth*, *Wesleyan* and *Williams*.

Examining the foreign delegations of the different institutions by continents, we note that the order in North America is *Pennsylvania*, *Columbia*, *Cornell*; in South America—*Pennsylvania*, *Cornell*, *Massachusetts Institute of Technology*; in Europe—*Pennsylvania*, *Columbia*, *Harvard*; in Asia—*Cornell*, *California*, *Harvard*; and in Australasia—*Pennsylvania*, *Northwestern*. Of the countries that send at least ten students to any one institution *Harvard* leads in Canada and England; *Pennsylvania* in Central America, Brazil, Germany, Australia and New Zealand; *Cornell* in Cuba, Mexico, Argentine Republic and China; *Columbia* in Russia and Japan. As for individual countries the order for Canada is *Harvard*, *Columbia*, *Michigan*, *Northwestern*, *Yale*; for Cuba—*Cornell*, *Pennsylvania*, *Columbia*; for Mexico—*Cornell*, *Pennsylvania*, *Missouri*; for Germany—*Pennsylvania*, *Harvard*, *Columbia*; for England—*Harvard*, *Columbia*, *Pennsylvania*; for Russia—*Columbia*, *Pennsylvania*, *Harvard*; for China—*Cornell*, *Harvard*, *Pennsylvania*, *Yale*; for India—*California*, *Ohio State*; for Japan—*Columbia*, *California*, *Yale*; for Australia—*Pennsylvania*, *Northwestern*.

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#### THE UNIFICATION OF THE METHODS OF ANALYSIS OF FATS AND OILS

THE International Commission for the Unification of the Methods of Analysis of Pe-

troleum Products having been able to accomplish so much it was thought that a commission along similar lines to consider the analysis of fats and oils would be of equal value and the need for some work along this line is evident when we consider to what an extent oils and fats are bought and sold on chemical analysis.

In order to bring this about there have been organized in various scientific societies committees for this purpose. At the present time committees, or sections as they are called, have been formed in Germany, Italy, France, Sweden, Holland, Hungary, Switzerland and England. These committees or sections are for the purpose of making a study of the conditions existing in their own country preliminary to the organization of an International Commission.

The committee or section in this country is made up of three committees, one from the American Chemical Society, one from the American Society for Testing Materials and one from the Association of Official Agricultural Chemists, which united in forming what is known as the Joint Committee on the Unification of the Methods of Analysis of Fats and Oils.

The work of this section, or committee, is first to study the condition in this country preliminary to taking part in an international conference and this work the committee considers of the first importance. The committee has secured the active cooperation of the U. S. Bureau of Standards which will enable it to carry on its work under the most advantageous conditions as regards standardizing of necessary apparatus and chemicals and the preparation of tables and samples.

So far the work under way is, first, consideration of tables and methods of expression of specific gravity and consideration of standard temperature conditions.

Second, a consideration of the meaning of cold or cloud tests in oils and the collection of data as to methods used and their interpretation.

Third, a consideration of the proper method of expressing acidity in oils and fats.

Fourth, a consideration of the proper method of standardizing refractometers.